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F2G

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(54) Hose coupling

(57) A hose coupling comprises a tubular connection portion (1) and a resilient clamping ring (2), the tubular connection portion being provided on its outside with a peripheral holding rib (6) over which the end portion (5) of the hose (4) and the clamping ring are jointly pushed. In order to facilitate this operation, the clamping ring (2) has slots (15) which extend radially therethrough and which are closed only at that peripheral edge region (17) of the clamping ring (2) which is towards the hose push-on end (7) of the holding rib (6). After the operation of pushing the hose and the clamping ring on to the connection portion, the web portions (16, 16') which define the slots (15) in the clamping ring are held together behind the holding rib (6), by a securing ring (3) which has a latching closure means (22), thereby also closing the opposite peripheral edge portion of the clamping ring (2). Thus, the web portions (16) of the clamping ring (2) can spread apart virtually over their whole length during positioning of the hose over the tubular connection, but are then firmly clamped by the separate securing ring.

Fig.1

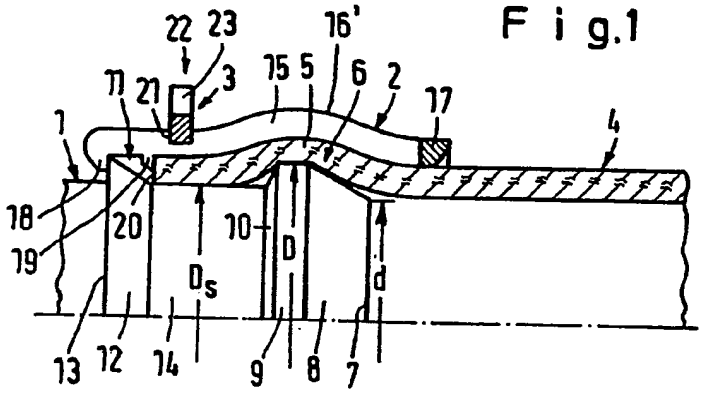

Fig.2

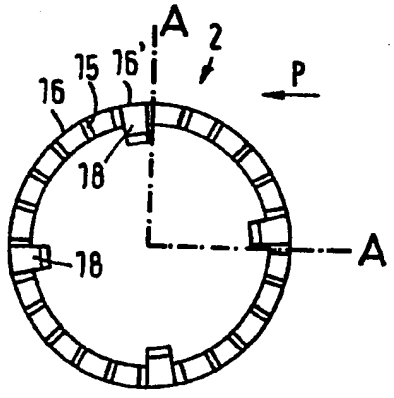

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Fig.1

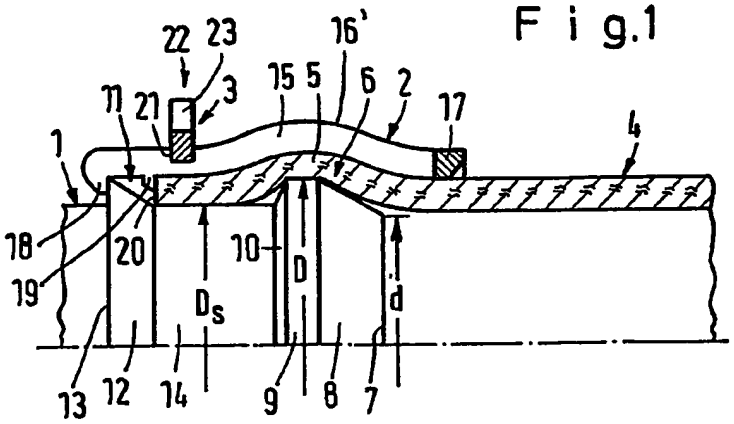


Fig.3

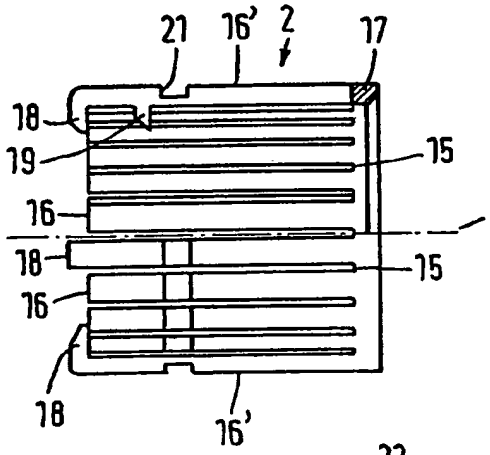


Fig.2

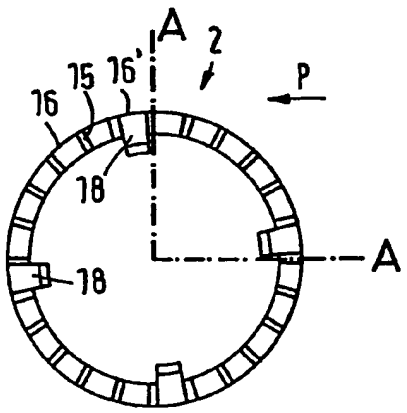


Fig.5

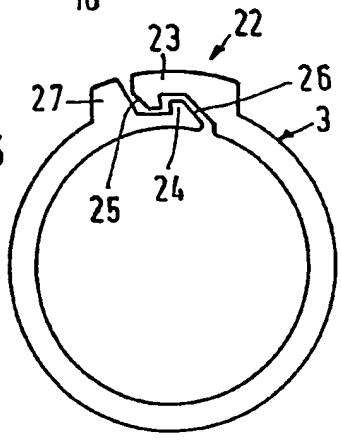
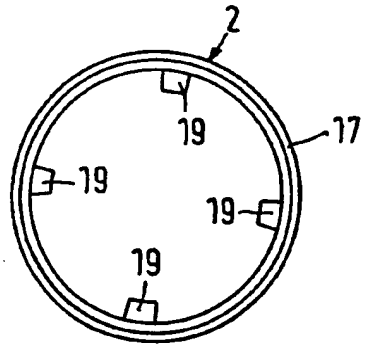


Fig.4



SPECIFICATION

Hose coupling

This invention relates to a hose coupling comprising a tubular connection portion on which an end portion of a hose may be pushed, and a clamping ring of resilient material. The tubular connection portion is provided on its outside with a first holding rib which extends therearound and whose front side which is towards the end of the tubular connection portion on which the hose may be pushed is of a diameter which decreases towards said end on which the hose may be pushed; the end portion of the hose being pushed over said first holding rib. The clamping ring surrounds the pushed-on end portion of the hose in the region of the holding rib, and is provided at its axial ends with closed peripheral edge portions of which the peripheral edge portion that is remote from the end of the tubular connection portion on which the hose may be pushed is closed by a latching closure. The clamping ring is provided with slots which extend in the axial direction of the clamping ring and which pass radially therethrough and which are uniformly distributed in the peripheral direction, and is of such a construction that, together with the hose, it can be pushed over the holding rib. The slots in the clamping ring extend at least over the entire axial length of the holding rib, the web portions between the slots are resiliently flexible in the radial direction, and the mean diameter and the inside diameter of the clamping ring in the region of the web portions, at least over the major part of the axial length of the holding rib, before the hose and the clamping ring are pushed on to the tubular connection portion, are constant and so selected that, after the hose and the clamping ring have been pushed on to the tubular connection portion, the web portions are resiliently bulged out in their axially middle region with which they pass over the top of the holding rib, and the web portions apply a resilient prestressing force on the hose.

In a hose coupling of the general kind set forth above, as disclosed in German patent application No. P 33 45 903.7–12 (Fig. 10) which is of earlier date, the peripheral edge portion of the clamping ring, which is remote from the end of the tubular connection portion on which the hose may be pushed, is formed intergrally with the clamping ring and is interruped at a peripheral location in the region of one of the slots and, at that location, is provided with a latching closure means. In order to make it easier for the hose and the clamping ring, together, to be pushed on to the tubular connection portion, the latching closure means is opened before the hose and the clamping ring are pushed on, and is closed again after that operation.

There is thus a need for a generally improved hose coupling of the general kind set forth, wherein the operation of pushing the hose and the clamping ring, jointly, on to the tubular connection portion, is even further facilitated, while however ensuring a high level of axial strength for the connection.

According to the present invention there is provided a hose coupling comprising a tubular connection portion on which an end portion of a hose may be pushed, and a clamping ring of resilient material, wherein the tubular connection portion is provided on its outside with a first holding rib which extends therearound and whose front side which is towards the end of the tubular connection portion on which the hose may be pushed is of a diameter which decreases towards said end on which the hose may be pushed, the end portion of the hose being pushed over said first holding rib, wherein the clamping ring is locatable to surround the pushed-on end portion of the hose in the region of the holding rib, and is provided at its axial ends with closed peripheral edge portions of which the peripheral edge portion that is remote from the end of the tubular connection portion on which the hose may be pushed is closed by a latching closure, the clamping ring being provided with slots which extend in the axial direction of the clamping ring and which pass radially therethrough and which are uniformly distributed in the peripheral direction, and being of such a construction that, together with the hose, it can be pushed over the holding rib, and wherein the slots in the the clamping ring extend at least over the entire axial length of the holding rib, the web portions between the slots are resiliently flexible in the radial direction, and the mean diameter and the inside diameter of the clamping ring in the region of the web portions, at least over the major part of the axial length of the holding rib, before the hose and the clamping ring are pushed on to the tubular connection portion, are constant and so selected that, after the hose and the clamping ring have been pushed on to the tubular connection portion, the web portions are resiliently bulged out in their axially middle region with which they pass over the top of the holding rib, and the web portions apply a resilient prestresing force on the hose, the slots in the clamping ring being formed continuously to the end of the clamping ring which is remote from the end of the tubular connection portion on which the hose may be pushed, and the end portion of the clamping ring, which is disposed at said end of the clamping ring, having a peripheral groove for accommodating a securing ring which has a latching closure means for closing said end portion of the clamping ring.

In this construction, firstly the securing ring and then the hose and the clamping ring

jointly, can be pushed on to the tubular connection portion. In this connection, the operation of pushing the hose and the clamping ring over the first holding rib is considerably facilitated because the web portions can also spread at their end which is remote from the end of the tubular connection portion on which the hose is pushed. That is to say, the web portions can spread virtually over their entire length. After the hose and the clamping ring have been pushed on, the securing ring, in the open condition, is then pushed over the clamping ring and intio the peripheral groove, and then closed. In the peripheral edge portion of the clamping ring, which is closed by the securing ring, the clamping ring can no longer open up or expand when the securing ring is in the closed condition. The hose and the clamping ring can then withstand high axial pulling forces.

Preferably at least some web portions of the clamping ring have a radially inwardly extending projection, which, in use of the coupling are in front of the end of the end portion of the hose which is pushed on to the tubular connection portion. Some projections may serve as abutment means for bearing against the end of the hose when the hose and the clamping ring are fitted together, in order to ensure that the hose and the clamping ring are fitted together to a sufficient distance, but not too far. If they were not fitted together over a sufficient distance, the spring action of the resilient web portions would not produce its full effect. If the clamping ring were to be pushed over the hose an excessive distance, the clamping ring would not have a defined position with respect to the holding rib, that is to say, in such a way that the web portions lie over the holding rib and are resiliently bulged out.

Advantageously each of the projections is provided at the free end of the respective web portion to allow the entire length of the web portions to act in regard to their spring action.

Conveniently the tubular connection portion has a second holding rib extending thereabout, on the side of the first holding rib which is remote from the end of the tubular connection portion on which the hose may be pushed, the second holding rib being disposed at a spacing from the first holding rib, the front side of the second holding rib, which is towards the end of the tubular connection portion on which the hose may be pushed, is conical, the projections engage behind the second holding rib, and at least some web portions of the clamping ring have a radially inwardly extending second projection to bear against the end of the hose end portion which is pushed on to the tubular connection portion, the second projection lying between the two holding ribs. This construction ensures that the coupling has an even higher level of strength to resist the hose being pulled axially off the tubular connection portion, while the further projections serve as abutment or support means for the end of the hose.

Furthermore, the top of the first holding rib may have a cylindrical peripheral surface which ensures a contact and sealing region of substantial surface area, without the hose material being subjected to an excessive pressure.

Preferably the outide diameter of the tubular connection portion, at the end on which the hose may be pushed, is approximately equal to the inside diameter of the hose when in the unstressed condition, and the outside diameter of the tubular connection portion, on the side of the first holding rib which is remote from the end of the tubular connection portion on which the hose may be pushed, is larger thant the diameter of the hose in the unstressed condition. This construction makes it easier for the tubular connection portion to be introduced into the hose and increases the contact pressure with which the hose bears against the tubular connection portion, between the two holding ribs.

For a better understanding of the present invention, and to show how the same may be carried into effect, referecne will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a side view, partly in axial section, of part of a hose coupling according to the invention,

Figure 2 is a front view of a clamping ring of the hose coupling of Fig. 1 according to the invention,

Figure 3 is a view in section taken along line A–A in the direction of the arrow P in Fig. 2,

Figure 4 is a rear view of the clamping ring of the hose coupling of Fig. 1, and

Figure 5 is a side view of a securing ring of the hose coupling of Fig. 1 according to the invention,

In the embodiment of the invention illustrated in Fig. 1, the hose coupling comprises a tubular conenction portion 1, a clamping ring 2 of resilient plastics material, and a securing ring 3 of resilient plastics material or metal. Clamped between the tubular connection portion 1 and the clamping ring 2 is one end portion 5 of a hose 4.

The tubular connection portion 1 has a first holding rib 6 which extends therearound. The holding rib 6 beings at the end 7 of the tubular connection portion, at which the hose 4 is pushed thereonto, and it has a conical side surfce 8 adjoining the end 7 of the tubular connection portion 1. Adjoining the conical surface 8 is a cylindrical peripheral surface 9.

The side surface 10 of the holding rib 6, which is remote from the end 7, is also conical, but it is inclined somewhat more steeply than the front side surface 8.

At a spacing from the first holding rib 6, the tubular connection portion 1 then has a second holding rib 11. The front side surface 12 which is towards the hose push-on end 7, is also conical, while the rear side surface 13 of the second holding rib 11 extends radially.

The outside diameter d at the hose push-on end 7 of the tubular connection portion 1 is equal to the inside diameter of the hose 1 in the unstressed condition. The outside diameter D_s of the cylindrical part 14 of the tubular connection portion 1, which is disposed between the holding ribs 6 and 11, is somewhat larger than the outside diameter d at the hose push-on end 7. The diameter D of the cylindrical peripheral surface 9 of the holding rib 6 is larger than the outside diameter D_s and equal to the maximum diameter of the holding rib 11. The pitch angles of the conical front side surfaces 8 and 12 of the holding ribs 6 and 11 are about 20°.

The clamping ring 2 has slots 15 which extend in the axial direction and which pass radially through the clamping ring. The slots 15 are defined by thin axial web portions 16 and are distributed at equal spacings around the periphery of the clamping ring 2. The slots 15 are delimited in one axial direction by a closed peripheral edge portion 17 and extend continuously through the clamping ring 2, in the other axial direction. Four web portions 16′ which are at the same angular spacings from each other in the peripheral direction are each provided at their free end with a radially inwardly extending projection 18 while in the vicinity of their end they are each provided with a further radially inwardly extending projection 19. The axial spacing of the projections 18 and 19 is so selected that the projections 18 can engage behind the holding rib 12, as shown in Fig. 1. The projections 19 bear against the end 20 of the hose 4 and limit the distance by which the end portion 5 of the hose 4 is introduced into the clamping ring and the distance by which the clamping ring 2 is pushed on to the end portion 5.

In the region between the holding ribs 6 and 11, the clamping ring 2 is provided with a peripheral groove 21 (see Fig. 3) in which the securing ring 3 is disposed. As shown in Fig. 5, the securing ring 3 is provided, in the peripheral direction, with an interruption which can be closed by a latching closure means 22. The closure means 22 has two closure portions 23 and 24 in the form of substantially radial projections which are formed on the closure means 22 on both sides of the interruption. The one closure portion 23 is of an undercut configuration at its radially inward side so that it is substantially of a hook-like shape. The other closure portion 24 is radially somewhat shorter than the closure portion 23 and is undercut on its radially outward side. The two closure portions 23 and 24 have an inclined butting or run-on surface 25 and 26 respectively, at their ends which are facing towards each other in the open condition of the securing ring 3. Another radial projection 27 which is also formed close to the interruption on the undercut side of the closure portion 24 facilitates the operation of closing the closure means. In that operation, the projections 23 and 24 are pressed together in the peripheral direction manually or by means of a tool, until the substantially radially inwardly projecting part of the closure portion 23 has slid beyond the closure portion 24 and engages behind the undercut configuration thereof. The closure means 22 may be opened again if desired by bending back the radial part of the closure portion 23, outwardly in a radial direction.

When the hose coupling shown in Fig. 1 is assembled, the securing ring 3, in the open condition, is firstly passed over the tubular connection portion 1, until reaching a position behind the holding rib 11. The hose 4 and the clamping ring 2, in the condition of being fitted together, are then jointly pushed on to the tubular connection portion 1 until they reach the position shown in Fig. 1, so that the projections 18 engage behind the holding rib 11 and the end of the hose lies between the holding ribs 6 and 11. The securing ring 3, in an open condition, is then pushed over the clamping ring 2 until it engages into the peripheral groove 21. The securing ring 3 is then closed in the manner described above.

The hose 4 and the tubular connection portion 1 are now firmly and sealing coupled together. The resiliency of the web portions 16 and 16′ gives a high level of sealing effect in the region of the holding rib 6, in particular in the region of the cylindrical peripheral surface 9 of the holding rib 6 and also in the region of the cylindrical part 14 of the tubular connection portion. Because of the resiliency of the web portions 16 and 16′, the clamping ring 2, if necessary, can adapt to deformation, which is caused by heat, of the hose material which is a plastics. The closed securing ring 3 also provides a closed peripheral edge portion for the clamping ring 2, which resists the clamping ring expanding or opening up in the region of that peripheral edge portion. The closed peripheral edge portion 17 is also unable to expand or open up. Because the clamping ring 2 projects beyond the hose push-on end of the tubular connection portion 1, it also prevents the hose 4 from being pulled off, by being bent over in a radial direction. The projections 18 which engage behind the holding rib 11 ensure with a high degree of security that the hose 1 cannot be pulled axially off the tubular connection portion 4. If however high axial forces are not to be expected, the projections 19 and the holding rib 11 can be omitted, in which case the

projections 18 perform the abutment function of the projections 19.

CLAIMS

1. A hose coupling comprising a tubular connection portion on which an end portion may be pushed, and a clamping ring of resilient material, wherein the tubular connection portion is provided on its outside with a first holding rib which extends therearound and whose front side which is towards the end of the tubular connection portion on which the hose may be pushed is of a diameter which decreases towards said end on which the hose may be pushed, the end portion of the hose being pushed over said first holding rib, wherein the clamping ring is locatable to surround the pushed-on end portion of the hose in the region of the holding rib, and is provided at its axial ends with closed peripheral edge portions of which the peripheral edge portion that is remote from the end of the tubular connection portion on which the hose may be pushed is closed by a latching closure, the clamping ring being provided with slots which extend in the axial direction of the clamping ring and which pass radially therethrough and which are uniformly distributed in the peripheral direction, and being of such a construction that, together with the hose, it can be pushed over the holding rib, and wherein the slots in the clamping ring extend at least over the entire axial length of the holding rib, the web portions between the slots are resiliently flexible in the radial direction, and the mean diameter and the inside diameter of the clamping ring in the region of the web portions, at least over the major part of the axial length of the holding rib, before the hose and the clamping ring are pushed on to the tubular connection portion, are constant and so selected that, after the hose and the clamping ring have been pushed onto the tubular connection portion, the web portions are resiliently bulged out in their axially middle region with which they pass over the top of the holding rib, and the web portions apply a resilient prestressing force on the hose, the slots in the clamping ring being formed continuously to the end of the clamping ring which is remote from the end of the tubular connection portion on which the hose may be pushed, and the end portion of the clamping ring, which is disposed at said end of the clamping ring, hving a peripheral groove for accommodating a securing ring which has a latching closure means for closing said end portion of the clamping ring.

2. A hose coupling according to claim 1, wherein, at least some web portions of the clamping ring have a radially inwardly extending projection, which in use of the coupling are in front of the end of the portion of the hose, which may be pushed on to the tubular connection portion.

3. A hose coupling according to claim 2, wherein each of the projections is provided at the free end of the respective web portion.

4. A hose coupling according to claim 3, wherein the tubular connection portion has a second holding rib extending therearound, on the side of the first holding rib extending therearound, on the side of the first holding rib which is remote from the end of the tubular connection portion on which the hose may be pushed, the second holding rib being disposed at a spacing from the first holding rib, wherein the front side of the second holding rib, which is towards the end of the tubular connection portion on which the hose may be pushed on, is conical, wherein the projections engage behind the second holding rib, and wherein at least some web portions of the clamping ring have a radially inwardly extending further projection to bear against the end of the end portion of the hose, which is pushed on to the tubular connection portion, said further projection lying between the two holding ribs.

5. A hose coupling according to any one of claims 1 to 4, wherein the top of the holding rib has a cylindrical peripheral surface.

6. A hose coupling according to any one of claims 1 to 5, wherein the outside diameter (d) of the tubular connection portion, at the end on which the hose may be pushed, is approximately equal to the inside diameter of the hose in the unstressed condition, and the outside diameter (D) of the tubular connection portion, on the side of the first holding rib which is remote from its end on which the hose may be pushed, is larger than the inside diameter of the hose in the unstressed condition.

7. A hose coupling substantially as hereinbefore described with reference to the accompanying drawings.

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